

REMARKS

Applicants thank the Examiner for the through consideration given the present application. Claims 3 and 5-9 are currently being prosecuted. The Examiner is respectfully requested to reconsider his rejections in view of the amendments and remarks as set forth below.

Rejection Under 35 U.S.C. § 112

Claims 1-7 stand rejected under 35 U.S.C. § 112, first paragraph. This rejection is respectfully traversed.

The Examiner felt that the term "symmetric" in claims 1, 6 and 7 was unclear since there was no line of symmetry along a pipe axis since the rows of grooves having different widths are not identical. While Applicants submit that the previous language was correct, nevertheless, claims 1, 6 and 7 have been amended to avoid any problems with the language. As seen in Figure 1, if a line is drawn in the middle of region C, the V-shaped areas on either side are symmetrically arranged. The Examiner states that these are not symmetrical. It is believed that the Examiner says this because the direction of the V-shaped patterns are reversed. However, since the claims now refer to the regions of the patterns being symmetrically arranged, this is correct since the regions are spaced equally on either side of the midpoint of section C. Furthermore, the symmetry has now been defined in regard to a line on the inner surface parallel to the pipe axis direction. This is to make the definition more accurate since the pipe axis direction itself in three dimensions would be at the center of the pipe rather than along the surface. In view of this, Applicants submit that this rejection is overcome.

Rejection Under 35 U.S.C. § 102 (b)

Claim 1 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Ishikawa et al. (Japanese 10-47880). The Examiner points out that if the twist angles in the different sections are the same, that the claim will be anticipated. The Examiner's statement apparently is in response to Applicants' argument that the V-shaped sections are not found in the reference. While it is true that V-shaped sections could be formed if the angles are the same in the different sections, it still would not necessarily happen. That is, although the longitudinal spacings between the grooves would be equal in the two sections adjoining the line where different grooves meet, they still would not necessarily form a V. That is, the grooves on one side could fall halfway or some other fraction between the grooves on the other side so that V's were not formed. V's would be formed only if the two sides are "in phase" and if they were specifically desired even if the twist angles are the same. Since the reference does not teach this, Applicants submit that claim 1 would define thereover.

Furthermore, claim 1 has now been cancelled, and incorporated into claims 8 and 9. Since claims 8 and 9 include the limitations of claims 2 and 4, which were not subject to this rejection, these claims are now believed to overcome this rejection.

Rejection Under 35 U.S.C. § 103

Claims 1-3 and 6-7 stand rejected under 35 U.S.C. § 103 as being obvious over Ishikawa et al. in view of Takashi et al. (Japanese 11-90530). This rejection is respectfully traversed.

The Examiner cited the Ishikawa et al. reference to show the claim limitations except the grooves of the first and second rows being the same. However, as pointed out above, this reference does not show the formation of V-shaped patterns.

The Examiner cited the Takashi et al. reference to show a pipe having a plurality of rows and grooves arranged in V-shaped patterns. The Examiner also points out that the Takashi reference shows secondary grooves. Applicants submit that the combination of elements found in independent claims 6, 7, 8 and 9 would not be obvious over the combination of these two references. Neither of these references, nor their combination teach a first row of parallel grooves and a second row of parallel grooves which form regions of V-shaped patterns with the regions being symmetrically arranged and where the first and second rows are different in width. Since the symmetrical V-shaped patterns are formed, the ends of the two types of grooves are continuously connected so that a refrigerant can be joined and branched at the ends of the grooves alternately. This causes a more effective branching and joining than the references. The V-shaped grooves allow the refrigerant to be spirally flowed since they are arranged diagonally with the relation to the axial direction of the pipe. The heat transfer distance is increased so that the heat transfer is improved.

Even if the two references are combined, they do not teach the concepts of the present invention. That is, there is no teaching that the regions of the V-shaped patterns can be formed symmetrically while the two kinds of rows have different widths in the circumferential direction. Applicants submit that this arrangement is not seen in the references, and would not be obvious thereover.

Furthermore, claims 8 and 9 also now include the limitations of the secondary grooves previously found in claims 2 and 4. In claim 8, the grooves are described as having a prescribed depth from a top side toward a base side. While Figure 4 of the Takashi reference seems to show some type of secondary groove, the abstract and figure are not clear as to the exact arrangement of the secondary grooves. Accordingly, if the Examiner continues to rely on this reference to show

these features, he is requested to point out where in the reference these features are shown and provide a translation of the necessary parts.

Likewise, claim 9 includes a description of the secondary grooves as being formed in an outer surface of at least part of the projected portions. This arrangement is not shown in any of the references and would not be obvious thereover. Accordingly, claim 9 is considered to be further allowable.

Claims 3 and 5 depend from allowable claims 8 and 9, respectively, and accordingly, are also considered to be allowable. In addition, these claims include additional limitations regarding the type of secondary grooves.

Claim 6 is a method claim corresponding to claims 8 and 9. Applicants submit that this claim is likewise allowable over the references for the reasons corresponding to the arguments presented above in regard to claims 8 and 9. In addition, Applicants submit that the references also did not show the combination of a series of steps which form two rows of grooves which form regions of V-shaped patterns symmetrically in the pipe body and also making secondary grooves while using a second marking roll. Accordingly, Applicants submit that claim 6 is likewise allowable over this combination of references.

Claim 7 is an independent claim for a device for manufacturing pipes which corresponds to claim 6. This claim is likewise allowable since the references do not show the combination of the various apparatus for making a pipe having two rows which form regions of V-shaped patterns symmetrically inside the pipe and also the second marking roll for making secondary grooves. Accordingly, Applicants submit that claim 7 is likewise allowable over this combination of references.

No Prosecution History Estoppel

Claims 6-9 are hereby presented in independent form. No prosecution history estoppel would apply to the interpretation of the limitations set forth in claims 6-9 and the claims that depend therefrom in view of the fact that this subject matter has been continuously presented since the original filing date of the present application.

Reasons for Entry of Amendment

At the outset, it is respectfully requested that the present Amendment should be entered into the Official file in view of the fact that the amendments to the claims automatically place the application in condition for allowance.

Furthermore, it is pointed out that the amendments to claims 6, 7, and the parts of claims 8 and 9 which were previously in claim 1, were made to overcome the 35 U.S.C. § 112 rejection, and therefore do not raise new issues. Further, the formation of claims 8 and 9 from claims 1, 2 and 4 reduces the number of claims and also reduces the number of issues. Accordingly, Applicants submit that the entry of the present Amendment furthers the prosecution and reduces the issues for appeal. Accordingly, Applicants request that the present Amendment should be entered for purposes of appeal, should the Examiner not agree that the application is in condition for allowance.

CONCLUSION

In view of the above remarks, it is believed that the claims clearly distinguish over the patents relied on by the Examiner, either alone or in combination. In view of this, reconsideration of the rejections and allowance of all of the claims are respectfully requested.

Since the remaining patents cited by the Examiner have not been utilized to reject the claims, but to merely show the state of the art, no comment need be made with respect thereto.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Mr. Robert F. Gnuse (Reg. No. 27,295) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

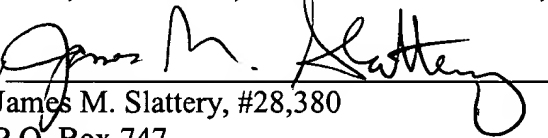
Attached hereto is a marked-up version of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment: Version with Markings to Show Changes Made

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please cancel claims 1, 2 and 4 without prejudice or disclaimer of the subject matter contained therein.

Please amend claims 3, 5, 6 and 7 as follows:

3. (Twice Amended) The heat-transfer pipe provided with internal grooves according to claim [2] 8, wherein said secondary grooves are notched grooves in a spiral direction.

5. (Twice Amended) The heat-transfer pipe provided with internal grooves according to claim [4] 9, wherein

said secondary grooves are fine grooves extending from one side surface of the projected portions to the other side surface thereof.

6. (Twice Amended) A method for manufacturing a heat-transfer pipe provided with internal grooves, comprising the continuous steps of:

marking a plurality of rows of grooves including a first row of parallel grooves and a second row of parallel grooves on a flat, plate-like heat-transfer pipe material by using a first marking roll, wherein

the parallel grooves in the first row and the parallel grooves in the second row form regions of V-shaped patterns said regions being arranged symmetrically with respect to a line on said inner surface parallel to a pipe axis direction, and

the first row and the second row are different in width in a circumferential direction of the pipe body;

marking secondary grooves at least in part of projected portions formed between respective grooves of the plurality of rows of the grooves which are arranged in the V-shaped patterns by using a second marking roll; and

forming the flat plate-like heat-transfer pipe material into a cylindrical pipe by using a roll forming device.

7. (Twice Amended) A device for manufacturing a heat-transfer pipe with internal grooves, comprising:

a first marking roll for marking a plurality of rows of grooves including a first row of parallel grooves and a second row of parallel grooves in a flat plate-like heat-transfer pipe material, wherein

the parallel grooves in the first row and the parallel grooves in the second row form regions of V-shaped patterns said regions being arranged symmetrically with respect to a line on said inner surface parallel to a pipe axis direction, and

the first row and the second row are different in width in a circumferential direction of the pipe body;

a second marking roll for marking secondary grooves at least in part of projected portions formed between respective grooves of the plurality of rows of the grooves arranged in V-shaped patterns; and

a roll forming device for forming the flat plate-like heat-transfer pipe material into a cylindrical pipe,

wherein the first marking roll, the second marking roll and the roll forming device are provided successively side by side in a direction of movement of the flat plate-like heat-transfer pipe material so as to continuously mark the grooves arranged in V-shaped patterns and the secondary grooves successively by the first and second marking rolls and then form a cylindrical pipe by roll forming by the roll forming device.

New claims 8 and 9 have been added.